

In the Claims

1-14 (canceled).

15 (new). A method of visualizing the endoplasmic reticulum of at least one cell comprising the steps of:

- a) expressing a polypeptide comprising AgNt84 (SEQ ID NO: 1) or metal binding fragments thereof, multimers of AgNt84 or metal binding fragments thereof, or fusion proteins comprising AgNt84 or metal binding fragments thereof, in at least one cell, provided that said polypeptide contains the ER-retention signal peptide HDEL or KDEL;
- b) fixing said at least one cell;
- c) contacting said at least one cell with an composition comprising a carrier and a metal ion; and
- d) visualizing said endoplasmic reticulum.

16 (new). The method according to claim 15, wherein said at least one cell is immunochemically stained with antibodies before or after said fixing step.

17 (new). The method according to claim 15, wherein said cells are contacted with a composition comprising at least one metal ion and said visualization step is performed via electron microscopy.

18 (new). The method according to claim 16, wherein said cells are contacted with a composition comprising at least one metal ion and said visualization step is performed via electron microscopy.

19 (new). A composition of matter comprising:

- a) an isolated polypeptide comprising:
  - 1) the polypeptide of SEQ ID NO: 1;

- 2) a variant polypeptide having at least about 20% to 99.99% identity to the polypeptide of SEQ ID NO: 1 and which has at least one of the biological activities associated with the polypeptide of SEQ ID NO: 1;
  - 3) a fragment of a polypeptide or a variant polypeptide, wherein said fragment or variant has substantially the same biologic activity as the polypeptide of SEQ ID NO: 1;
  - 4) a signal peptide comprising the amino acid sequence MGYSKTFLLLGLAFVLLISSDVSA (SEQ ID NO: 3) or a fragment thereof, optionally fused, in frame, to a heterologous polypeptide sequence;
  - 5) a polypeptide comprising the amino acid sequence HGHRHVHGHGHHGHVHGNGNEHGHGHHHGRGHPGH (SEQ ID NO: 4), wherein said polypeptide has the ability to bind metal atoms;
  - 6) a multimeric polypeptide construct comprising: i) (SEQ ID NO: 1)<sub>x</sub>; ii) (SEQ ID NO: 4)<sub>x</sub>; iii) [L-(SEQ ID NO: 1)]<sub>x</sub>; or iv) [L-(SEQ ID NO: 4)]<sub>x</sub>, wherein L is a linker element joined to the polypeptide of SEQ ID NO: 1 or 4 and x is an integer from 2 to 100; or
  - 7) a polypeptide comprising [(SEQ ID NO: 3)-L]<sub>x</sub>-Y, wherein x is an integer between 1 and 10, L is a linker element and Y is a heterologous polypeptide sequence;
- b) an isolated, recombinant or purified polynucleotide sequence comprising:
- 1) a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4 or a polynucleotide sequence complementary thereto;
  - 2) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said polynucleotide encodes a polypeptide having at least one of the biological activities or the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;

- 3) a polynucleotide sequence encoding a biologically active fragment of a polypeptide selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said biologically active fragment has at least one of the biological activities of the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 4) a polynucleotide sequence comprising SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 5) a polynucleotide sequence having at least about 20% to 99.99% identity to the polynucleotide sequence of SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 6) a polynucleotide sequence encoding variant of a polypeptide or fragment thereof selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said variant or variant has at least one of the biological activities associated with the polypeptides of SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 7) a polynucleotide sequence encoding a multimeric construct comprising: i) (SEQ ID NO: 1)<sub>x</sub>; ii) (SEQ ID NO: 4)<sub>x</sub>; iii) [L-(SEQ ID NO: 1)]<sub>x</sub>; or iv) [L-(SEQ ID NO: 4)]<sub>x</sub>, wherein L is a linker element joined to the polypeptide of SEQ ID NO: 1 or 4 and x is an integer from 2 to 100; or
  - 8) a polynucleotide that hybridizes under low, intermediate or high stringency with any of said polynucleotides;
- c) a host cell comprising:
- 1) a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4 or a polynucleotide sequence complementary thereto;
  - 2) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said polynucleotide encodes a polypeptide having at least one of the biological activities or the

- polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
- 3) a polynucleotide sequence encoding a biologically active fragment of a polypeptide selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said biologically active fragment has at least one of the biological activities of the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 4) a polynucleotide sequence comprising SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 5) a polynucleotide sequence having at least about 20% to 99.99% identity to the polynucleotide sequence of SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 6) a polynucleotide sequence encoding variant of a polypeptide or fragment thereof selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said variant or variant has at least one of the biological activities associated with the polypeptides of SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 7) a polynucleotide sequence encoding a multimeric construct comprising: i) (SEQ ID NO: 1)<sub>x</sub>; ii) (SEQ ID NO: 4)<sub>x</sub>; iii) [L-(SEQ ID NO: 1)]<sub>x</sub>; or iv) [L-(SEQ ID NO: 4)]<sub>x</sub>, wherein L is a linker element joined to the polypeptide of SEQ ID NO: 1 or 4 and x is an integer from 2 to 100; or
  - 8) a polynucleotide that hybridizes under low, intermediate or high stringency with any of said polynucleotides;
- d) a transformed plant cell comprising:
- 1) a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4 or a polynucleotide sequence complementary thereto;
  - 2) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide sequence encoding a polypeptide sequence selected from the

- group consisting of SEQ ID NOs: 1, 3, and 4, wherein said polynucleotide encodes a polypeptide having at least one of the biological activities or the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
- 3) a polynucleotide sequence encoding a biologically active fragment of a polypeptide selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said biologically active fragment has at least one of the biological activities of the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 4) a polynucleotide sequence comprising SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 5) a polynucleotide sequence having at least about 20% to 99.99% identity to the polynucleotide sequence of SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
  - 6) a polynucleotide sequence encoding variant of a polypeptide or fragment thereof selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said variant or variant has at least one of the biological activities associated with the polypeptides of SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
  - 7) a polynucleotide sequence encoding a multimeric construct comprising: i) (SEQ ID NO: 1)<sub>x</sub>; ii) (SEQ ID NO: 4)<sub>x</sub>; iii) [L-(SEQ ID NO: 1)]<sub>x</sub>; or iv) [L-(SEQ ID NO: 4)]<sub>x</sub>, wherein L is a linker element joined to the polypeptide of SEQ ID NO: 1 or 4 and x is an integer from 2 to 100; or
  - 8) a polynucleotide that hybridizes under low, intermediate or high stringency with any of said polynucleotides; or
- e) a transformed plant comprising:
- 1) a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4 or a polynucleotide sequence complementary thereto;

- 2) a polynucleotide sequence having at least about 20% to 99.99% identity to a polynucleotide sequence encoding a polypeptide sequence selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said polynucleotide encodes a polypeptide having at least one of the biological activities or the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
- 3) a polynucleotide sequence encoding a biologically active fragment of a polypeptide selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said biologically active fragment has at least one of the biological activities of the polypeptides comprising SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
- 4) a polynucleotide sequence comprising SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
- 5) a polynucleotide sequence having at least about 20% to 99.99% identity to the polynucleotide sequence of SEQ ID NO: 2 or a polynucleotide sequence complementary thereto;
- 6) a polynucleotide sequence encoding variant of a polypeptide or fragment thereof selected from the group consisting of SEQ ID NOs: 1, 3, and 4, wherein said variant or variant has at least on of the biological activities associated with the polypeptides of SEQ ID NO: 1, 3, or 4 or a polynucleotide sequence complementary thereto;
- 7) a polynucleotide sequence encoding a multimeric construct comprising: i) (SEQ ID NO: 1)<sub>x</sub>; ii) (SEQ ID NO: 4)<sub>x</sub>; iii) [L-(SEQ ID NO: 1)]<sub>x</sub>; or iv) [L-(SEQ ID NO: 4)]<sub>x</sub>, wherein L is a linker element joined to the polypeptide of SEQ ID NO: 1 or 4 and x is an integer from 2 to 100; or
- 8) a polynucleotide that hybridizes under low, intermediate or high stringency with any of said polynucleotides.

20 (new). The composition of matter according to claim 19, wherein said polynucleotide comprises a portion of a genetic construct or vector.

21 (new). The composition of matter according to claim 19, wherein said polypeptide is attached to a solid support.

22 (new). The composition of matter according to claim 21, wherein said polypeptide attached to a solid support comprising protein chips, protein arrays, microcantilevers, or biosensors, said polypeptide comprising the AgNt84 polypeptide (SEQ ID NO: 1) or metal binding fragments thereof, multimers of AgNt84 or metal binding fragments thereof, or fusion proteins of AgNt84 or metal binding fragments thereof.

23 (new). A method for bioremediation or phytoremediation of sites contaminated with metals comprising: a) identifying a site suitable for bioremediation; b) providing microbes, trees, or plants expressing a polypeptide comprising AgNt84 (SEQ ID NO: 1) or metal binding fragments thereof, multimers of AgNt84 or metal binding fragments thereof, or fusion proteins of AgNt84 or metal binding fragments thereof; growing said microbes, trees or plants at said site under conditions that allow for the accumulation of metals that contaminate said site in said microbes, trees, or plants; and, optionally, harvesting said microbes, plants, or said trees to remove the metal contaminants from the site.

24 (new). A method of targeting polypeptides to the cell wall of a plant cell comprising transforming a plant cell with a genetic construct encoding a polypeptide comprising AgNt84 (SEQ ID NO: 1) or fusion proteins of AgNt84 and growing said cell under conditions that allow for the expression of the genetic construct and the translocation of the expressed polypeptide to the cell wall of said cell.